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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/583,920	06/20/2006	Michael J. Sailor	0321.68811	5068

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EXAMINER	
JANSSEN, SHANNON L	

ART UNIT	PAPER NUMBER
1636	

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07/18/2011	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/583,920	SAILOR ET AL.	
	Examiner	Art Unit	
	SHANNON JANSSEN	1636	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 May 2011*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *34,37-42 and 45* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *34,37-42 and 45* is/are rejected.

7)☒ Claim(s) *34 and 45* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claims 34, 37-42 and 45 are pending in the instant application, and are the subject of the Office Action below.

Please note: The examiner of record has changed. Please address all future correspondence to the examiner listed at the conclusion of this action.

Claim Objections

Claims 34 and 45 are objected to because of the following informalities: There should only be one period at the end of each claim and it appears that the phrase "a singular particular etching a code" should be "a single particular etching code." In addition, claim 45 is dependent on a canceled claim (e.g.: claim 35). Appropriate correction is required.

New Rejections

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 34, 37-42, and 45 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 34 and 45 recite encoded particles having an ordered multi-layer porosity structure configured to produce a signal that corresponds to a particular etching a code. It is unclear what structure is encompassed by the claims. For example, are the pores being etched or is there a separate code being etched? Is the optical signal the code or does the optical signal

correspond to a code that has been etched. Claims 37-42 fail to overcome this and are similarly rejected.

Claim 42 recites the limitation "the thin film" in line 1. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 34, 37-38, 41, 42, and 45 rejected under 35 U.S.C. 102(b) as being anticipated by Cunin et al. (Biomolecular screening with encoded porous-silicon photonic crystals, 2002, Nature Materials, Vol 1, pp 39-41, cited by applicants in IDS).

Regarding present **claims 34, 42, and 45**, Cunin et al. teach multilayered encoded particles (i.e.: more than one, a library) with layers of varying porosity and thickness and different refractive indices (see p 39, col 1, amd Figure 3 and description, which states the different current variations and periodicities to etch the different layers), wherein the particles are 15 μm (i.e.: micron-sized particles), wherein the particles are made from silicon wafers (i.e.: porous silicon, a semi-conductor material, an ordered physical multi-layered structure with

multiple porosity interfaces (in the form of multiple porous layers), having multiple optical thicknesses, wherein the physical multi-layer structure is configured to produce an optical signature in the form of an interference pattern, in that this is an inherent property of multiple layers with different refractive indices and Cunin et al. teach that the particles have a specific optical signal; see entire document, particularly pp 39-40, Figures).

Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product by process claim is the same as or obvious from a product of the prior art, the claim is unpatentably distinct even though the prior product was made by a different process, *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966(Fed. Cir. 1985).

Regarding present **claims 37-38 and 41**, Cunin et al. teach coating the particles with albumin (i.e.: a receptor for a biological analyte, where at least some of the particles would be present in the pores since the solution is incubated on the whole substrate; see p 39, col 2, p 40, col 1), and further teach FITC-conjugated goat anti-rabbit IgG conjugated to the immobilized albumin (see p 40, col 1).

Therefore, the teachings of Cunin et al. anticipate present claims 34, 37-38, 41, 42, and 45.

Claims 34, 37-42, and 45 are rejected under 35 U.S.C. 102(e) as being anticipated by Sailor et al. (US Patent Application 2005/0042764, with priority to February 7, 2002, cited by applicants in IDS).

The applied reference has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

Regarding present **claims 34 and 45,** Sailor et al. teach optically encoded particles (i.e.: more than one, a library) comprising multiple layers with different porosities and different thicknesses (i.e.: multi-layer porosity structure with multiple porosity interfaces between consecutive multiple porosity layers, the multiple porosity layers having multiple optical thicknesses; see [0020-0022], claims 1, 4, 13, 21, and 36-40) made by an etching process that results in a specific code (i.e.: configured to produce an optical signature in the form of an interference pattern in the reflectivity spectrum; see entire document, particularly [0020-0024, 0026, 0027], claims 1-40).

Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product by process claim is the same as or obvious from a product of the prior art, the claim is unpatentably distinct even though

the prior product was made by a different process, *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966(Fed. Cir. 1985).

Regarding present **claims 37-41,** Sailor et al. teach receptors in the pores, wherein the receptors are for a biological, chemical, or gaseous analyte, and further teach a fluorescent tag (see [0025, 0040-0042, 0044], claims 15-17).

Regarding present **claim 42**, Sailor et al. teach porous silicon (see [0029], for example).

Therefore, the teachings of Sailor et al. anticipate the presently claimed invention.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere* ***Co.***, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out

the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 34, 37-42, and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cunin et al. (Biomolecular screening with encoded porous-silicon photonic crystals, 2002, Nature Materials, Vol 1, pp 39-41, cited by applicants in IDS) and Chan et al. (Nanoscale microcavities for biomedical sensor applications, 2000, Proceedings of SPIE, Vol 3912, pp 23-34).

Regarding present **claims 34, 42, and 45**, Cunin et al. teach multilayered encoded particles (i.e.: more than one, a library) with layers of varying porosity and thickness and different refractive indices (see p 39, col 1, amd Figure 3 and description, which states the different current variations and periodicities to etch the different layers), wherein the particles are 15 μm (i.e.: micron-sized particles), wherein the particles are made from silicon wafers (i.e.: porous silicon, a semi-conductor material, an ordered physical multi-layered structure with multiple porosity interfaces (in the form of multiple porous layers), having multiple optical thicknesses, wherein the physical multi-layer structure is configured to produce an optical signature in the form of an interference pattern, in that this is an inherent property of multiple layers with different refractive indices and Cunin et al. teach that the particles have a specific optical signal; see entire document, particularly pp 39-40, Figures).

Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product by process claim is the

same as or obvious from a product of the prior art, the claim is unpatentably distinct even though the prior product was made by a different process, *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966(Fed. Cir. 1985).

Regarding present **claims 37-38 and 41**, Cunin et al. teach coating the particles with albumin (i.e.: a receptor for a biological analyte, where at least some of the particles would be present in the pores since the solution is incubated on the whole substrate; see p 39, col 2, p 40, col 1), and further teach FITC-conjugated goat anti-rabbit IgG conjugated to the immobilized albumin (see p 40, col 1).

While Cunin et al. teach micron-sized optically encoded particles with receptors and fluorescent tags with the pores, Cunin et al. do not specifically teach wherein the receptor is for a chemical analyte as recited in present **claim 39**.

However, Chan et al. teach biosensors for detecting analytes made of porous silicon and further teach adsorption of DNA, chemical analytes and gaseous vapors within the pores, and a fluorescent molecule attached to the DNA immobilized with the pores (i.e.: biological, chemical, or gas "receptor"; see entire document, particularly p 23, pp 29-32, and more specifically sections 4.1, 4.1.2, 4.2.1, 4.2.2), which also reads on present claims 37-41.

Therefor it would have been obvious to one of skill in the art at the time of the instant invention to utilize the optically encoded particles taught by Cunin et al. as sensors for chemical or gaseous analytes as taught by Chan et al. One would have been motivated to do so because one of ordinary skill in the art would have recognized the advantages of using the optically encoded particles of Cunin et al. as a sensor because Cunin et al. teach the "issue of immobilizing biochemical or chemical components is not expected to be significant" and Chan et

al. teach that "Porous silicon nanostructures are ideal hosts for sensor applications". One would have had a reasonable expectation for success because both Cunin et al. and Chan et al. teach porous semiconductor substrates/particles for optical-based sensing that relies on the use of refractive index variations to create a discernable signal upon a binding event.

Therefore, the teachings of Cunin et al. and Chan et al. renders the present invention *prima facie* obvious.

Claims 34, 37-39 and 45, are rejected under 35 U.S.C. § 103(a) as being unpatentable over Trau *et al.*, U.S Patent No. 2003/0124564, published on July 3, 2003, previously cited, in view of Li *et al.*, U.S. Patent No. 5,168,104, issued on December 1, 1992, previously cited.

Trau teaches highly functionalized, porous organosilica particles and methods of their synthesis are described that employ high amounts of functional silane such as 3-mercaptopropyl trimethoxysilane. Silane particle diameters are controlled from less than 1 micron to over 100 micron. The particles have a high surface area due to their internal structures, which consist of large pores, typically up to 10 m that are linked by small channels of typically about 20 nm diameter. Trau states:

> "In a preferred embodiment, ***multiple***, for example, six, different types of ***particles are made, each having a different thickness of optic coating***. During use, the six types are distinguished on the basis of scattering signals, despite their having the same fluorescent inner regions. This technique is ***particularly desirable for use in combinatorial chemistry as it provides another factor for distinguishing particle types. The technique of using light scattering for distinguishing different particle types is facilitated by the high porosity of the particles***. In a preferred embodiment, ***the difference in refractive index, more specifically the refractive index profile (e.g. generated by the varying porosity within each particle), gives rise to a unique scattering signature from each particle***."

Trau, paragraph 0091 (emphasis added).

Also described on the particles are thin films that contribute to the porosity variation and allow for the coding:

> "In a corresponding embodiment, different batches of particles are coated with ***different thicknesses of clear silicon shell, and the differing optic properties from the altered thicknesses are relied on to distinguish the particles***. For example, a first group of 0.5 micron average diameter particles are coated with 0.1 micron shell (0.7 micron final diameter), and a second group of 0.5 micron average diameter particles are coated with 0.3 micron shell (1.1 micron final diameter). The first group of particles are optically distinguished from the second group of particles by their different light scattering properties. The second group will more readily scatter 1 micron wavelength light than the first group. Both types are flowed through an imaging flow cell and optic imaging signals are produced that distinguish the different particle types based on their different scattering characteristics.
>
> The scattering properties of the particles can also be altered by incorporation of other materials into the particles either during synthesis (e.g., by incorporating titanium isopropoxide or similar reagent with the silane monomer) or post synthesis. These materials could include Ti and Al to alter the scattering and Fe to give the particles magnetic properties.
>
> In a preferred embodiment, multiple, for example, six, different types of particles are made, ***each having a different thickness of optic coating***. During use, the six types are distinguished on the basis of scattering signals, despite their having the same fluorescent inner regions. This technique is particularly desirable for use in combinatorial chemistry as it provides another factor for distinguishing particle types. The technique of using light scattering for distinguishing different particle types is facilitated by the high porosity of the particles. In a preferred embodiment, the difference in refractive index, more specifically the refractive index profile (e.g. generated by the varying porosity within each particle), gives rise to a unique scattering signature from each particle."

Trau, paragraphs 0089-0091 (emphasis added); and

> Additionally, other favorable properties of the particles can be relied on to generate or modulate signals for distinguishing particles. In particular, it will be appreciated that the size of particles used (both carrier and/or optical tag particle) will generate different light scattering signals. Those

> specific ***scattering signals may be used to distinguish particles***. For example, a ***larger particle will be distinguished from a smaller particle because the smaller particle will refract light at different wavelengths than a larger particle. Moreover, particles with different refractive index profiles will generate different scattering signatures (e.g. as will result from different porosity profiles)***."

Trau, paragraph 0113 (emphasis added).

Trau also teaches refractive index changes and varying porosity and varying thickness (see captioned sections above).

Claims 37-39 are directed towards "receptors", Trau teaches an antibody (see paragraph 0029). As in claim 41, Trau teaches flourescent tags (see captioned portions above). As in claim 42, Trau teaches silicon particles (paragraphs 0008 and 0013).

Although Trau teaches the preparation of a library of particles meeting the instant invention, he does not explicitly state that the binders are located within the pores of the particles.

Li teaches that micron sized silica beads with pores having a binding agents for affinity applications are provided with a ligand that is actually found within the pore structure of the bead (see section titled, *Background Art*).

One of ordinary skill in the art would have had a reasonable expectation of success in arriving at the invention as claimed because it is well-known and demonstrated in the art that upon the formation of porous beads that host ligand binding agents, that the chemical attachment of the ligand binding agent results in the agent residing in the pore. Therefore, the invention as a whole was *prima facie* obvious at the time it was invented.

Response to Arguments

Applicant's arguments filed May 2, 2011 have been fully considered but they are not persuasive for the following reasons. Applicants' arguments are presented in Italics.

Applicants assert that the particles taught by Trau et al. are manufactured by a different process and cannot contain different porosity layers due to the manufacturing process (Response, pp 4+).

However, it is firstly noted that even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product by process claim is the same as or obvious from a product of the prior art, the claim is unpatentably distinct even though the prior product was made by a different process, *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966(Fed. Cir. 1985). In the instant case, the process of making the particles does not distinguish the instant claimed particles from the particles taught by Trau et al. (e.g.: the particles taught by Trau et al. could be manufactured by an etching process as well). In addition, the instant claims do not exclude a thin film coating as part of the multiple different porosity layers (e.g.: the particle with the thin film coating comprises multiple different porosity layers of different thicknesses, as discussed supra). In other words, the coating has a different porosity from the porous particle it covers and represents a multiple porosity interface between porosity layers which provides a code for the particle, and wherein the particle and the coating have different thicknesses, as discussed supra. The instant claims also do not exclude random porosity variation. The instant claims do not exclude other methods for generating particles, such as the methods taught by Trau et al., and the instant claims also recite fluorescent tags. Applicants are respectfully reminded that the instant claims are directed to a

product and not a method of making the product. The instant claims are not limited to pores of any particular size and applicants have not shown that the particles taught by Trau et al. could not be made by an etching method.

Applicant's arguments with respect to the combination of Nakano et al. have been considered but are moot in view of the new ground(s) of rejection (i.e.: Nakano et al. is no longer included in the rejection).

Claims 34, 37-42 and 45, are rejected under 35 U.S.C. 103(a) as being unpatentable over Trau and Li, as applied to claims 34, 37-39 and 45 above, and further in view of Ghadhiri *et al.*, U.S. Patent No. 6,248,530, issued on June 19, 2001, previously cited.

The limitations of claims 34, 37-39, and 45, and the applicable teachings of Trau and Li, can be found in the rejections above, and are hereby incorporated by reference.

Although Trau and Li teach the claimed particles, neither explicitly states that their disclosed particles could be used as a "gas" phase sensor system, or act as a "gas receptor".

Ghadhiri teaches that the measurement of the wavelength shifts in the reflectometric interference spectra of a porous semiconductor substrate such as silicon, make possible the highly sensitive detection, identification and quantification of small analyte molecules. The sensor of the subject invention is effective in detecting multiple layers of biomolecular interactions, termed "cascade sensing", including sensitive detection of small molecule recognition events that take place relatively far from the semiconductor surface, such as various gases adsorbed to the silicon surface.

One of ordinary skill in the art would have had a reasonable expectation of success in arriving at the invention as claimed because Trau and Ghadhiri are directed towards the use of porous semiconductor substrates/particles for optical-based sensing that relies on the use of refractive index variations to create a discernable signal upon a binding event. One of ordinary skill in the art would have recognized the advantages of using and the approach of Ghadhiri with the optically encoded particles of Trau because of the applications for gas-based sensor. Therefore, the invention as a whole was *prima facie* obvious at the time it was invented.

Response to Arguments

Applicant's arguments filed May 2, 2011 have been fully considered but they are not persuasive for the following reasons. Applicants' arguments are presented in Italics.

Applicants traversed the rejection with the same arguments presented above.

Therefor applicants are respectfully directed to the above answer to the traversal.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re*

Goodman, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 34, 37-42, and 45 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-23 of U.S. Patent No. 7,318,903, hereafter the '903 patent, in view of Chan et al. (Nanoscale microcavities for biomedical sensor applications, 2000, Proceedings of SPIE, Vol 3912, pp 23-34).

The '903 patent teaches photonic crystals of porous silicon, and a method of fabricating photonic crystals of porous material, comprising: providing a silicon substrate; etching the silicon substrate to obtain a first patterned layer; treating the first dielectric mirror to impart a first surface affinity to the first patterned layer; etching a second patterned layer immediately beneath the first patterned layer to a second patterned layer, wherein the first and second

patterned layers are patterned to produce a characteristic reflection and predetermined wavelengths; releasing the first and second patterned layers as a freestanding film; treating the second patterned layer to impart a second surface affinity to the second patterned layer; and fracturing the free standing film into micron-sized particles, wherein the substrate comprises a crystal silicon substrate (i.e.: micron-sized semiconductor or insulator particle having an integral and ordered multi-layer porosity structure with multiple porosity interfaces, the multiple porosity layers having multiple optical thicknesses, etc.; see claims 1-2, 7-17, and 21-23).

The '903 patent also teaches coating the surfaces with dodecene and oxide (i.e.: receptors; see claims 21-22).

While the '903 patent teaches optically encoded porous particles for detecting analytes, the '903 patent does not specifically teach wherein the receptors are located in the pores, as recited in present claims 37-41.

However, Chan et al. teach biosensors for detecting analytes made of porous silicon and further teach adsorption of DNA, chemical analytes and gaseous vapors within the pores, and a fluorescent molecule attached to the DNA immobilized with the pores (i.e.: biological, chemical, or gas "receptor"; see entire document, particularly p 23, pp 29-32, and more specifically sections 4.1, 4.1.2, 4.2.1, 4.2.2), which reads on present claims 37-41.

Therefor it would have been obvious to one of skill in the art at the time of the instant invention to utilize the optically encoded particles taught by the '903 patent as sensors for chemical or gaseous analytes as taught by Chan et al. One would have been motivated to do so because one of ordinary skill in the art would have recognized the advantages of using the optically encoded particles of the '903 patent as a sensor because Chan et al. teach that "Porous

silicon nanostructures are ideal hosts for sensor applications". One would have had a reasonable expectation for success because both the '903 patent and Chan et al. teach porous semiconductor substrates/particles for optical-based sensing that relies on the use of refractive index variations to create a discernable signal upon a binding event.

Therefore, the teachings of the '903 patent and Chan et al. renders the present invention *prima facie* obvious.

Claims 34, 37-42, and 45 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 18, 20-24, and 26-43 of copending Application No. 10/589741. Although the conflicting claims are not identical, they are not patentably distinct from each other because both are directed to optically encoded particles comprising layers with different porosities and refractive indices and further comprising receptors for a biological, chemical, or gaseous analyte and a fluorescent tag.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claims 34, 37-42, and 45 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-10, 32-35, 38, 40-46, 67-69, 85-87, and 89-91 of copending Application No. 10/503217. Although the conflicting claims are not identical, they are not patentably distinct from each other because both are directed to optically encoded particles comprising layers with different porosities and refractive indices and further comprising receptors for a biological, chemical, or gaseous analyte and a fluorescent tag.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Future Communications

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SHANNON JANSSEN whose telephone number is (571)270-1303. The examiner can normally be reached on Monday-Friday 10:00AM-7:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ardin Marschel can be reached on (571) 272-0718. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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